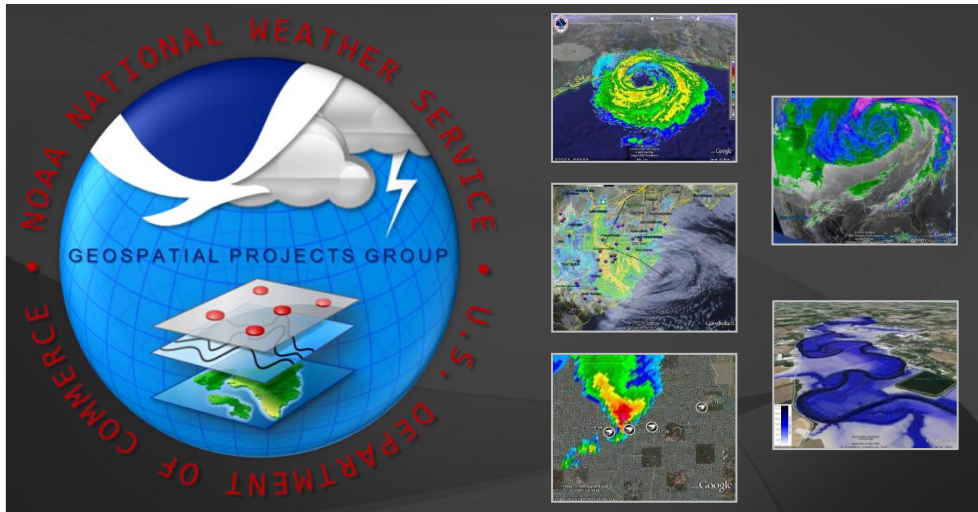


Your source for sharing geospatial news, projects, and activities across the National Weather Service



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Situational Awareness & Decision Support

Meet EDD - A New GIS-Centric Enhanced Data Display!

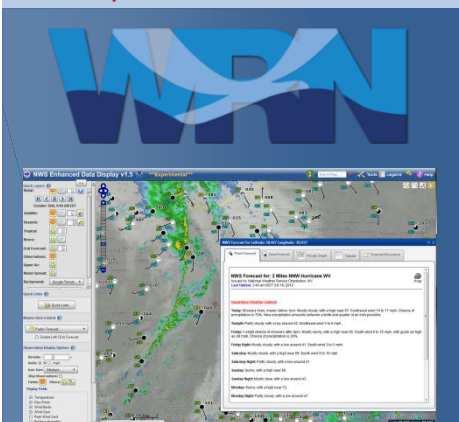
By: Chris Leonardi - NWS Mesoscale Science to Operations Pilot Project - Charleston, WV

The "Mesoscale Science to Operations" Pilot Project, located at the National Weather Service office in Charleston, West Virginia (RLX), is one of six created as part of the National Weather Service's Weather-Ready Nation initiative. Two of the stated objectives of this project are to "improve availability and configurability of NWS gridded data to core partners via an enhanced data display" and to "develop a web-based geospatial database to allow queries." These objectives are being realized in the new interface that we call EDD – keeping the "Enhanced Data Display" wording from the objective. Jonathan Wolfe, one of the three Emergency Response Specialists at RLX, is the primary developer of the interface.

The main goal of EDD is to consolidate much of the data and GIS tools used by the National Weather Service into one user-friendly web mapping display. EDD is coded using Object Oriented JavaScript with a backend PostGIS database to allow for agile data flexibility, management, and presentation. The interface can be used with most major desktop browsers such as Internet Explorer, Firefox, and Chrome. A version tailored to mobile devices is also in the works.

See Figure (right) for an example of the EDD interface. The left menu has access to common "Quick Layers" like radar, satellite, observations, and others. A button provides access to "More Layers," many of which are products from the various NWS national centers (HPC, NHC, SPC, etc.). Some layers are sourced from educational partners such as UW-Madison and Iowa State. The order and opacity of layers is changeable by the user. Observations, in particular, are highly configurable. Observation density, magnification, and visible fields are all selectable, and the capability to filter observations (e.g. all subfreezing temperatures, wind gusts in excess of 40 knots, etc.) is included.

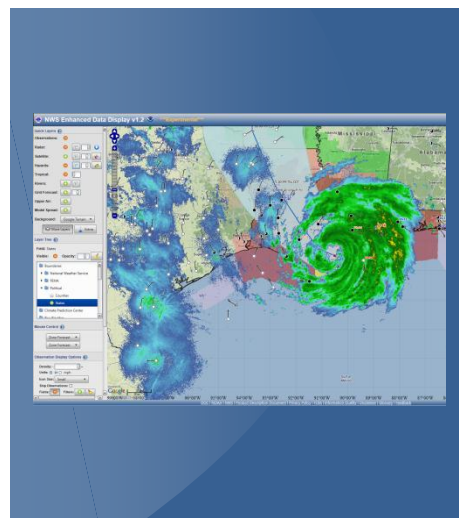
The map interface on the right is easily zoomable, with a choice of several backgrounds provided on the left menu. A search box at the top allows for quick location centering, and support for drawing tools is being built in. Right-clicking (can be changed to left-click if desired) on the map will bring up a window with various NWS forecast in various formats, including point-based and zone forecasts, as well as in tabular and hourly graph form. Social media features are



also being developed, as you can see along the bottom edge. The Help Center, accessible on the upper right of the display, contains a user guide in PDF form which will give you many more details on EDD's capabilities.

We envision that EDD will be of great use to everyone: meteorologists providing decision support services in the field, emergency managers, state and local officials, and even the general public. The figure (right) shows an earlier version of EDD, but demonstrates the interface's usefulness during high-impact events like Hurricane Isaac.

You can access EDD from two web locations. The version at <http://www.erh.noaa.gov/rlx/edd> can be accessed from anywhere, but may not be the most up-to-date version and may have certain features broken from time to time. The development version, which is more "cutting edge" but can be accessed only on the NWS WAN, is located at <http://dev.nids.noaa.gov/~jwolfe/mwp/trunk/edd/build/>. Feel free to try EDD out, and please give us feedback using the button on the upper right!



Using GIS to Raise Hurricane Inland Flooding Awareness in the Mid-Atlantic United States

By: Cody Moser, PhD - NWS Middle Atlantic River Forecast Center - State College, PA

Using ArcGIS, maps were created to raise awareness on the topic of inland flooding in the Mid-Atlantic United States caused by hurricanes. Two case studies – Floyd (September 1999) and Irene (August 2011) were chosen for analysis.

Maps were created with the following goals in mind:

- (1) Show that inland flooding can occur hundreds of miles away from the center of a hurricane track.
- (2) Show that inland flooding can occur hours to days before, during, and after the center of a hurricane has passed.

Hurricane path and magnitude data were gathered from NOAA's Coastal Services Center Historical Hurricane Track Interactive Mapping Application at <http://www.csc.noaa.gov/hurricanes/#>. Flood flow magnitude and timing data were obtained from the USGS National Water Information System (NWIS) page at (<http://waterdata.usgs.gov/usa/nwis/sw>) and the Middle Atlantic River Forecast Center's Flood Database at <http://www.erh.noaa.gov/marfc/Rivers/FloodClimo/>.

Both hurricanes had similar paths and magnitudes along the Mid-Atlantic Coast. Using an extrapolated hurricane path, maximum inland flood distance and crest time was determined for minor, moderate, and major flooding during each event. Note that inland flooding caused by these hurricanes in other parts of the eastern United States was not included in the analysis.

Results for the Mid-Atlantic region are as follows:

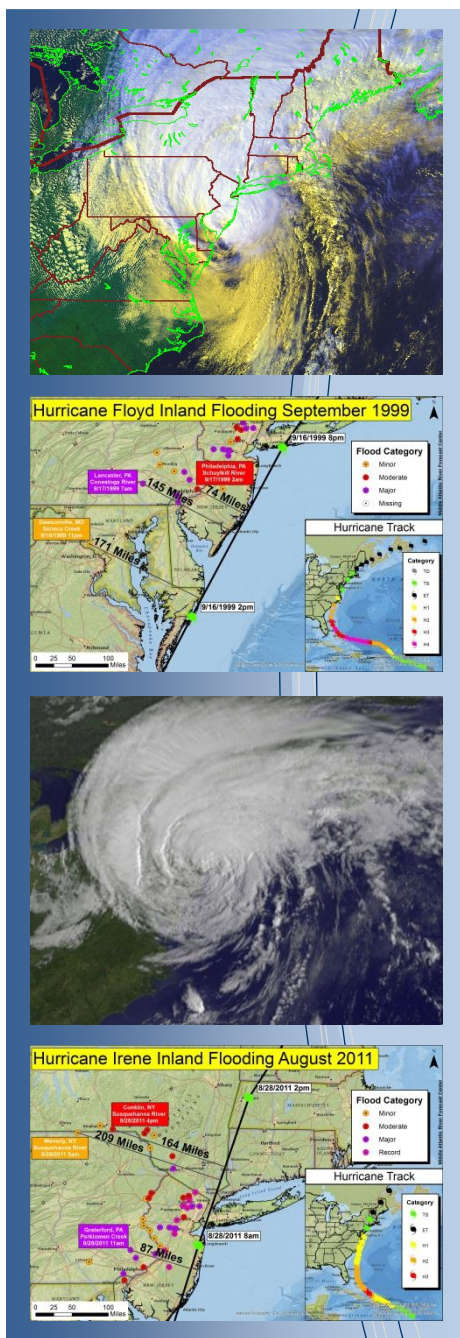
Hurricane Floyd (upper left)

- Minor flooding - 171 miles, 8 hours after hurricane center
- Moderate flooding - 74 miles, 8 hours after hurricane center
- Major flooding - 145 miles, 14 hours after hurricane center

Hurricane Irene (lower left)

- Minor flooding - 209 miles, 17 hours after hurricane center
- Moderate flooding - 164 miles, 4 hours after hurricane center
- Major flooding - 87 miles, 4 hours after hurricane center

These maps will likely be used for flood education outreach and future event briefings to raise awareness on various inland flooding scenarios.



NWS Flood Inundation Mapping Goes Google

By: Kris Lander - NWS Central Region Headquarters - Kansas City, MO

Flood inundation maps depicting the spatial extent and depth of floodwaters, linked to National Weather Service (NWS) river forecasts, are a powerful tool that can be used to help the public understand flood risk. Flood inundation mapping allows a single NWS forecast point to accurately convey flood risk across an entire community, by virtually placing a stream gage in every backyard. The AHPS flood inundation mapping (FIM) interface has been designed to convey flood risk to both technical and non-technical users at [75+ locations](#) across the lower 48 states. Emergency responders, businesses, citizens, neighborhoods or community services have been empowered to evaluate their individual or collective risk, and take action accordingly.

The public has become increasingly geospatially literate through the use of Google Maps; Google Maps is now a familiar and mainstream web tool. The NWS recently enhanced and updated the Advanced Hydrologic Prediction Service (AHPS) Flood Inundation Mapping (FIM) Services with the Google Maps base map in February 2012. The full color Google base map replaces the legacy base map that consisted of black and white aerial photography. The purposes of this enhancement were to provide a better overall user experience with a familiar web mapping service application, and update the functionality of the AHPS FIM viewer.

Google Maps has been seamlessly integrated within the existing user interface. Multiple depth rasters are stacked on top of a Google base map within the [AHPS FIM interface](#). The Google base map provides users with access to recent high-resolution aerial satellite images, detailed road maps, and shaded topographic maps. These familiar Google base maps allow users to easily navigate across the community and identify local landmarks.

In addition to the Google Maps base map update, numerous enhancements were made to the functionality of the AHPS FIM user interface. AHPS users now have the option to adjust layer transparencies, zoom, pan, search location, check flood depths, geolocate based on point-and-click actions, and turn on/off individual supplemental data layers. These capabilities to interrogate the map are powerful, yet the interface remains intuitive and user friendly.

Several resources are available to assist users in discovering the full capabilities of the flood inundation maps. A [full user guide](#) has been published on AHPS, and a [YouTube video](#) was produced by Eastern Region HQ. These guides have been fully integrated within the mapping interface as online help features.

Links:

Flood Inundation Mapping Locations

<http://water.weather.gov/ahps/inundation.php>

Example Mapping Location: Wildcat Creek at Manhattan Scenic Drive, KS

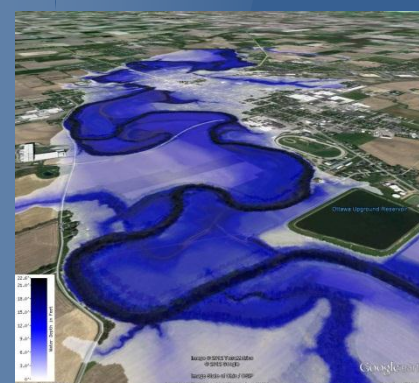
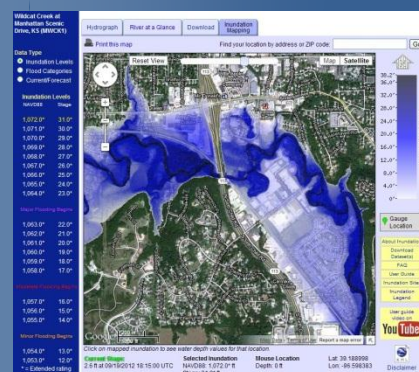
http://water.weather.gov/ahps2/inundation/inundation_google.php?gage=mwck1

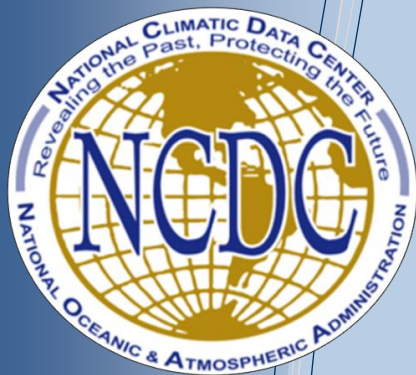
User Guide on YouTube

<http://water.weather.gov/ahps2/nwsexit.php?url=http://www.youtube.com/watch?v=flyTdd7f2Jl>

Printed User Guide

http://water.weather.gov/ahps2/inundation/inundation_mapping_user_guide.pdf





The Regional Snowfall Impact Scale: Putting Regional-Scale Societal Impacts of Snowstorms into Long Term Historical Perspective

By: Mike Squires - National Climatic Data Center - Asheville, NC

Snowstorms can have a devastating effect on transportation, commerce, emergency services, and utilities. In an effort to quantify these effects and put them into a century scale historical perspective, NOAA's National Climatic Data Center is producing an experimental regional snowfall impact index. Knowing the amount of snowfall is critical; however it's important to have a sense of the societal impacts of the storm. Unfortunately, long and consistent records of economic activity, snow removal costs, school closings, and other societal activity on daily time scales are not available. However population information can be used as a proxy for estimating societal impacts. Thus the Regional Snowfall Index (RSI) is based on population along with the spatial extent of the storm and total snowfall from the storm. Including population information ties the index to societal impacts.

RSI is an evolution of the Northeast Snowfall Impact Scale (NESIS) which NCDC began producing operationally in 2005. While NESIS was developed for storms that had a major impact in the Northeast, it also includes snowfall and population information from other regions as well. It can be thought of as a quasi-national index that is calibrated to Northeast snowstorms. By contrast, RSI is a regional index; a separate index is produced for each of the six NCDC climate regions in the eastern two-thirds of the nation. RSI has been calculated for 558 snowstorms that occurred between 1900 and 2012, which allows RSI to put snowstorms into a century-scale historical perspective.

The equation used to calculate the Regional Snowfall Index (RSI) is given by:

$$RSI = \sum_{T=T_1}^{T_4} \left[\left(\frac{A_T}{\bar{A}_T} + \frac{P_T}{\bar{P}_T} \right) \right]$$

where:

T = region specific snowfall thresholds (inches of snowfall)

A_T = area (square miles) affected by snowfall greater than threshold T

\bar{A}_T = mean area (square miles) affected by snowfall greater than threshold T

P_T = population affected by snowfall greater than threshold T

\bar{P}_T = mean population affected by snowfall greater than threshold T

The regions referred to above are the six eastern NCDC Climate Regions. The region specific snowfall thresholds, T , serve to calibrate RSI to each region. For example, the regional snowfall thresholds for the South region are 2", 5", 10", and 15" while thresholds for the East North Central region are 3", 7", 14", and 21". These thresholds were chosen with the help of 10 and 25 year-return period statistics to help ensure objective and consistent choices across regions. Table 1 below lists the thresholds (snowfall in inches), area (square miles) and population (2000 Census) for all the regions. The area and population values are divided by

REGION	Area (mi ²)	Population	T1	T2	T3	T4
Ohio Valley	310,367	46,987,525	3	6	12	18
Upper Midwest	254,766	23,147,922	3	7	14	21
Northeast	178,509	60,246,523	4	10	20	30
South	563,004	36,977,926	2	5	10	15
Southeast	285,895	47,755,771	2	5	10	15
Northern Rockies and Plains	470,385	4,504,284	3	7	14	21

Table 1: Area and population for the NCDC Climate Regions shown in Figure 1. T1-T4 are the specific snowfall thresholds (inches) used in the RSI algorithm.



RSI Category Definitions		
Category	RSI Raw Score	Approximate Percent Of Storms
5	>18	1%
4	10-18	2%
3	6-10	5%
2	3-6	13%
1	1-3	25%
0	0-1	54%

Table 2: RSI categories

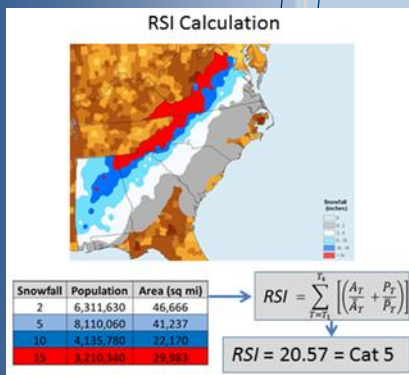


Figure 1: RSI Calculation for March 1993 Storm

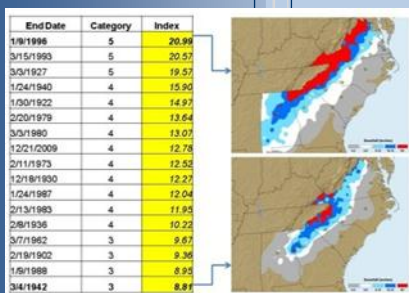


Figure 2: Top 20 southeastern storms

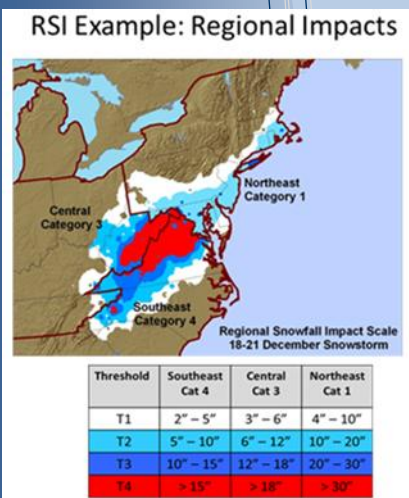


Figure 3: Example of a multi-region storm

their mean values in the equation because in a typical storm the area is one to two orders of magnitude less than the population. Using the mean area and population to normalize each term ensures the RSI distributions for all regions are similar despite large differences in regional snowfall climatologies, region population, and region area. This is a desirable attribute because it allows comparisons of snowstorms across regions. For example, a snowstorm in the Southeast may receive less snow than the Northeast for the same storm, but the societal impacts may be similar. This is because the Northeast is more resilient to snowstorms – there is more snow removal equipment and people have more experience dealing with snowstorms. Having similar index values across regions also makes it easier for the public to understand the index. Once an RSI is calculated, it is converted to a categorical score from 1 (notable) through 5 (extreme). See table 2 on the left. Complete details on the calculation of RSI can be found at... <http://www1.ncdc.noaa.gov/pub/data/cmb/snow-and-ice/rsi/regional-snowfall-impact-scale-27th-iips-v3a.pdf>.

The process for calculating a RSI value for the March 12-14, 1993 super storm is shown in Figure 1. The earth tone grid is population density with lighter colors indicating higher population. The population and snowfall grids are both 5km resolution and the individual grid cells align with each other. The area of snowfall and population associated with each threshold are calculated within a GIS using reclassification and zonal statistics methods and written to a table which provides all the required inputs to the RSI algorithm. The final RSI value for this storm is 20.57 which would be a Category 5 storm.

The RSI values have no physical meaning; their purpose is to rank regional snowstorms in terms of societal impacts and place them into historical perspective. So how does a particular RSI value relate to a snowfall map? The top 20 Southeastern snowstorms are listed in Figure 2 along with snowfall maps of the top and 20th ranked storms. Metropolitan areas with populations over half a million people are indicated by stars on the maps. This comparison gives a sense how different RSI values relate to spatial distributions of snowfall and population.

Figure 2 shows a December 2009 snowstorm which affected the Ohio Valley, Northeast, and Southeast. The total storm snowfall in each region on the map is symbolized by region specific values. The areas of red and dark blue in the Ohio Valley and Southeast indicate heavy snowfall relative to these regions and hence the Category 3 and 4 rankings, respectively. The Northeast, on the other hand, is only Category 1 due to the higher thresholds for this region. This is an example of how RSI is able to discriminate societal impacts between regions.

In summary, the Regional Snowfall Index - based on population and snowfall - is an effort to measure the societal impacts of snowstorms on a regional scale and put those impacts into a century-scale historical perspective. This is important because the same storm can have different regional impacts not only as a result of a storm's evolution, but also because of regional differences in snowstorm resiliency. RSI is calculated as needed shortly after a storm has ended. The RSI is considered experimental because it has not gone through a complete peer review process. A journal article is being finalized at the time of this newsletter. RSI information can be found at: <http://www.ncdc.noaa.gov/snow-and-ice/rsi/>. This site contains more detailed information on the RSI methodology, the snowfall and population data used to calculate RSI, as well as a mapping application. For more information or access to the 558 shapefiles used to calculate the RSI values, contact the author directly at Mike.Squires@noaa.gov .

Using GIS for Assessing Flash Flood Potential at the Grand Junction WFO after the 2012 Wildfire Season

By: Matthew Aleksa - NWS Weather Forecast Office - Grand Junction, CO

The winter of 2011-2012 was particularly dry with the Colorado snowpack as of March 1st, reading anywhere from 50-89% of normal. The last time the Colorado snowpack was that low was on March 1st, 2002, when the average was 50-70% of normal with southwest Colorado being less than 50% of normal. This led to an active fire weather season in 2002, where the largest wildfire in Colorado history occurred, the Hayman fire, which burned 137,760 acres. 2,500 firefighters were used to fight the fire, with five firefighter deaths and a firefighting cost of \$39 million. In fact, four wildfires that year made the top five, all ranking above the previous record held by the 26,000 acre Lime Creek fire in 1879. Because this year was so dry, forecasters at the Grand Junction, Colorado NWS office were thinking that the 2012 wildfire season had the potential to be similar to that of 2002. Sure enough, 4 wildfires that occurred in 2012 ranked among the top ten of largest wildfires in Colorado history joining the 4 wildfires from 2002. One in particular, the High Park fire, burned 87,250 acres ranking second among the top ten list, just above the 2002 Missionary Ridge fire, which burned 71,739 acres.

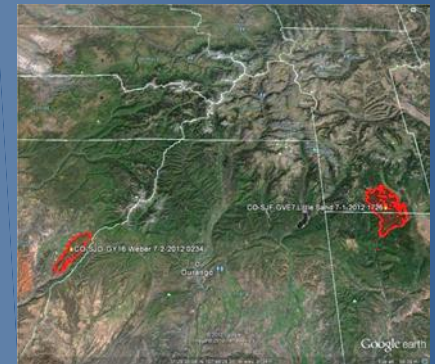
June is typically the driest month climatologically speaking on the western slope, with a high pressure ridge positioned over the Great Basin resulting in dry, hot weather. Any storms that form are typically high based, producing more wind than rain. By the end of June and beginning of July, the ridge shifts eastward over the south/central plains, bringing moisture northward from the Baja Peninsula and Gulf of California in a clockwise direction around the high center. This results in a moist, southwest flow and the development of thunderstorms most afternoons producing heavy rainfall. This is otherwise known as the southwest monsoon season and starts at the beginning of July, lasting through the end of August, but can sometimes extend into October.

With the monsoon season coming after an active wildfire season, an easier way to assess flash flood potential was needed in the event of any heavy rain falling over the burn scar areas. Using ArcGIS, a map was developed of the wildfire perimeters for eastern Utah and western Colorado during the 2012 season, which represented burn scars or areas where vegetation was burned due to wildfires. These burn scars indicated where soils were impervious to water and had a higher potential for flash flooding, mudslides and debris flows due to heavy rain. The map was converted into a KML file for use in Google Earth, and also converted into a shapefile for operational use in AWIPS during the monsoon season. This helped forecasters better assess where heavy rain was occurring in relation to the burn scar areas, which prompted the issuance of flash flood warnings when needed.

The monsoon was still ongoing toward the end of August, and the Grand Junction WFO was going to be providing decision support for the 2012 USA Pro Cycle Challenge Race. This race was held August 20th through the 26th. The first four stages took place across Grand Junction's forecast area in western Colorado. To enhance decision support capabilities, a KML file was created to be used in Google Earth for each route of the first four stages. This enabled the office to provide real time updates and helped distinguish where weather could impact the riders along the course. This was of great benefit to the forecasters during the active monsoon season, especially since the Grand Junction radar was inoperable at the time due to technical issues.



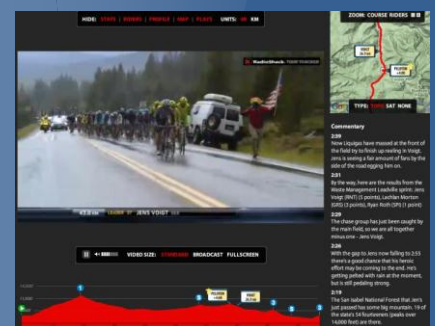
The High Park fire northwest of Fort Collins, Colorado as it made a run to the north on Thursday, June 14, 2012. (Image: Denver Post)



2012 Wildfire Burn Scar map viewed in Google Earth (zoomed in on southwest Colorado)



Stage 1 of the Pro Cycle Challenge displayed in Google Earth



Live webcast of the Pro Cycle Challenge

Products, Services, & Studies

The Eastern Region Grid Verification Dashboard: Use of Google Earth for Near-Real Time Grid Verification

By: David Radell - NWS Eastern Region Headquarters - Bohemia, NY



The NWS/Eastern Region Scientific Services Division has developed a suite of grid verification products to provide WFOs near real time feedback on the quality of NDFD forecast grids. The grid verification output is displayed in Google Earth, and users are able to drill down to individual grid points or zoom out to the entire CONUS region. The plots automatically update every three hours for the temperature, dewpoint, relative humidity, wind speed, and 6-hour QPF elements, and use the Real Time Mesoscale Analysis (De Pondeca et al. 2011; RTMA) as the gridded observational field. Grid verification products from forecast hours 1 to 36 are available for each element, which coincides with the Eastern Region Enhanced Short Term Forecasting Initiative. The verification, with its more timely spatial information outside of a single CWA location or GFE Edit area, compliments the very robust BOIVerify GFE verification tool and automated verification emails that are widely used for forecaster feedback.



Figure 1a: Temperature difference (36-hr NDFD forecast – RTMA analysis; °F) with NCEP fronts valid at 1200 UTC 15 October 2012



Figure 1b: Temperature difference (24-hr NDFD forecast – RTMA analysis; °F) with NCEP fronts valid at 1200 UTC 15 October 2012



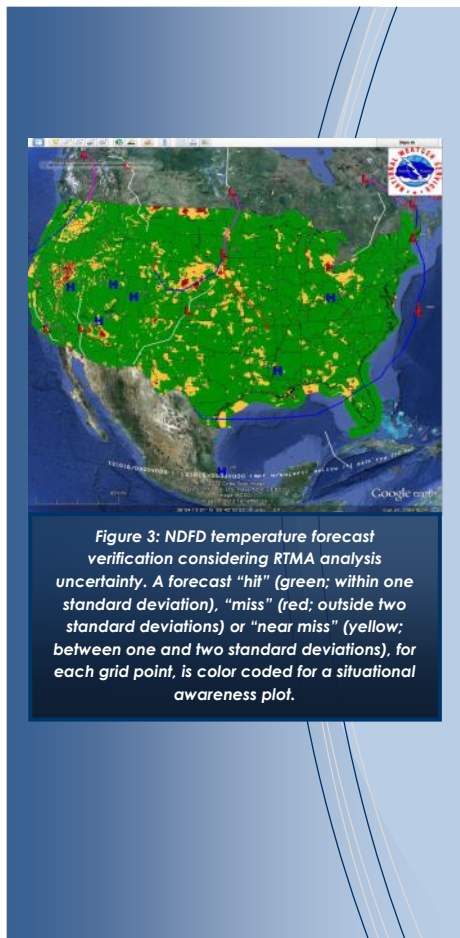
Figure 1c: Temperature difference (3-hr NDFD forecast – RTMA analysis; °F) with NCEP fronts valid at 1200 UTC 15 October 2012

The primary goal in providing forecasters near real time verification feedback is to raise awareness of the frequency of grid forecast “busts” in addition to aiding in forecast decision making on appropriate guidance from which to populate the grids. Grid “differences” (RTMA subtracted from NDFD for each cycle) are provided for each element as part of the dashboard. Example plots of grid differences from recent NWS gridded temperature forecasts are provided in Figure 1 from a case in October 2012 where a moderate cold front passed through the northeast U.S. Red shading indicates an overforecast (too warm) while blue shading indicates an underforecast (too cool). The temperature forecast difference plots show the evolution of the forecasts from the 36 hour forecast (Fig. 1a), through the 24-hour forecast (Fig. 1b), to the 3-hour forecast (Fig. 1c). Ideally, the magnitude of the forecast difference should decrease (less color) with decreasing forecast projection, as it converges toward the observations. Out ahead of the cold front, the grid temperature forecasts appear generally too cool by about 4-8 °F, while behind the front they are generally too warm. As the forecast projection decreases, so does the magnitude and coverage of the differences, indicating continued refinement of the grid forecasts toward 1200 UTC.



Figure 2: NDFD forecast “updates” between the 6-hr and 3-hr temperature forecasts valid at 0900 UTC 16 October 2012. Warm colors

In addition to routine grid difference plots, forecast grid “update” (subtracted consecutive NDFD forecasts) information is also available from the verification dashboard (Fig. 2). The forecast “update” plots depict the changes, or grid updates, to consecutive forecasts. For instance, if the 1200 UTC temperature forecast is adjusted up a few degrees at 0900 UTC (3-hr forecast) from 0600 UTC (6-hr forecast) on 15 October 2012, red shading will occur at affected grid points. The forecast update plots are available for forecast hours 1 to 36, and show how changes to the grid forecasts evolve.



Finally, a simple method using RTMA uncertainty information (Radell 2012) for grid verification is also available from the Dashboard (Fig. 3). The analysis uncertainty value at a grid point is a function of the RTMA's systematic, observational, and first guess errors. The RTMA uncertainty can be used to provide verification information at grid points where the analysis is less certain, thus providing a "window" or "interval" in which to verify the forecast. The RTMA uncertainty value can be considered to represent one standard deviation about the RTMA grid point value. For example, an RTMA temperature value of 55°F, with $\pm 2^\circ\text{F}$ uncertainty, would become an uncertainty interval of 53°F -57°F. The "true" temperature can fall anywhere within this interval. Grid forecasts that fall within this interval might be considered a "hit" (Fig. 3, green), while those far outside (± 2 standard deviations) a "miss" (Fig. 3, red). Those grid forecasts that fall between ± 1 and ± 2 standard deviations might be considered a "good enough forecast" (Fig. 3, yellow). A summary spatial "stop light" plot for a three hour NDFD temperature forecast difference gives users a quick "heads up" look as to whether public grid forecasts are in the ballpark of the RTMA, taking analysis uncertainty into account.

In addition to the grid verification information, observations, satellite imagery and a 24-hour archive of data are also available. The grid verification dashboard products are available in KMZ format for Google Earth or other GIS display software for NWS offices.

References:

De Pondecia, Manuel S. F. V., and Coauthors, 2011: The Real-Time Mesoscale Analysis at NOAA's National Centers for Environmental Prediction: Current status and development. *Wea. Forecasting*, 26, 593–612.

Radell, D. B., 2012: A method to incorporate analysis uncertainty into real time grid verification. *Peak Performance*, Spring 2012, pp. 6-8. Available online at: https://verification.nws.noaa.gov/content/pm/pubs/peak/2012/2012_Spring_NewsLetter.pdf

Regional GIS Maps - A.K.A. Using our Own Data

By: Nathan Foster - NWS Weather Forecast Office - Burlington, VT

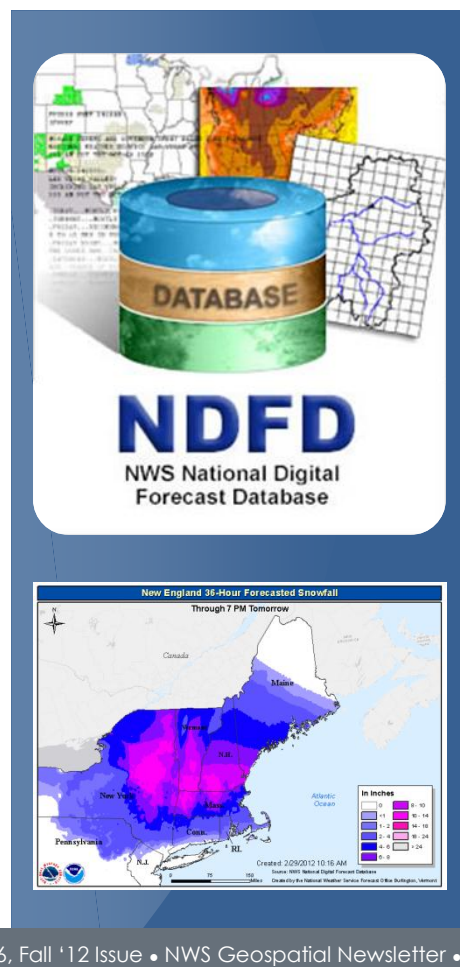
Here are some questions and comments we have heard from NWS users (public, media, state emergency management): What's a CWA? Why doesn't your map include the whole state? I'm driving from here to there, but your map is cut off.

These issues are of our own making because we often post maps only pertaining to the CWA in which we forecast. Our users do not understand our CWA boundaries, nor should they have to. Every WFO in the nation produces the same data which are readily available from NDFD. Why do we go to the trouble of collaborating if we are only going to show users what was produced by a sole WFO?

In an effort to address our customer's concerns with producing a more regional concept of maps, WFO Burlington has created a semi-automated process which uses NDFD data and ArcMap for any staff member to easily produce regional maps for posting on social media platforms, internal storm review write-ups or for decision support briefings to partners.

A script was developed which automatically runs at set intervals throughout the day and downloads NDFD grid files, turns them into shapefiles and makes the files available on the office LAN. Then, with the help of an ArcMap template, we have a series of ArcMap scripts which produce a regional forecast map image for any forecast element.

In the example, you can see the forecasted snowfall for all of the northeastern US. We have noticed these eye-catching maps get shared through social media much more frequently than maps specific to our CWA. The reason is simple; many of our users have friends or relatives in nearby states, so they share these maps with them to help get the word out. It also gives a much more complete



picture of the storm. While the user may think it's bad where they are, they can see in the neighboring state that it's twice as bad. We have used this regional overview for many different types of maps including: heat waves (MaxT and ApparentT), freeze threats (MinT), wind chill (Apparent T), heavy rainfall (QPF), Snowfall, watch/warning/advisories, storm reports and even regional radar views for "nowcast" information. Sometimes we will add text, icons, or explanations to help the user gain as much information as they can simply by looking at the map.

By taking a more regional approach to our GIS maps, we not only enhance the awareness of the users in our own CWA, but also their friends and family in neighboring CWAs. It also has the added benefit of using the data we work so hard to create, not only at our own WFO, but neighboring WFOs as well. For additional information about these maps, please contact Nathan Foster at nathan.foster@noaa.gov.



Usage of Google Maps to Organize Hurricane Isaac Flood Surveys

By: W. Scott Lincoln - NWS Lower Mississippi River Forecast Center - Slidell, LA

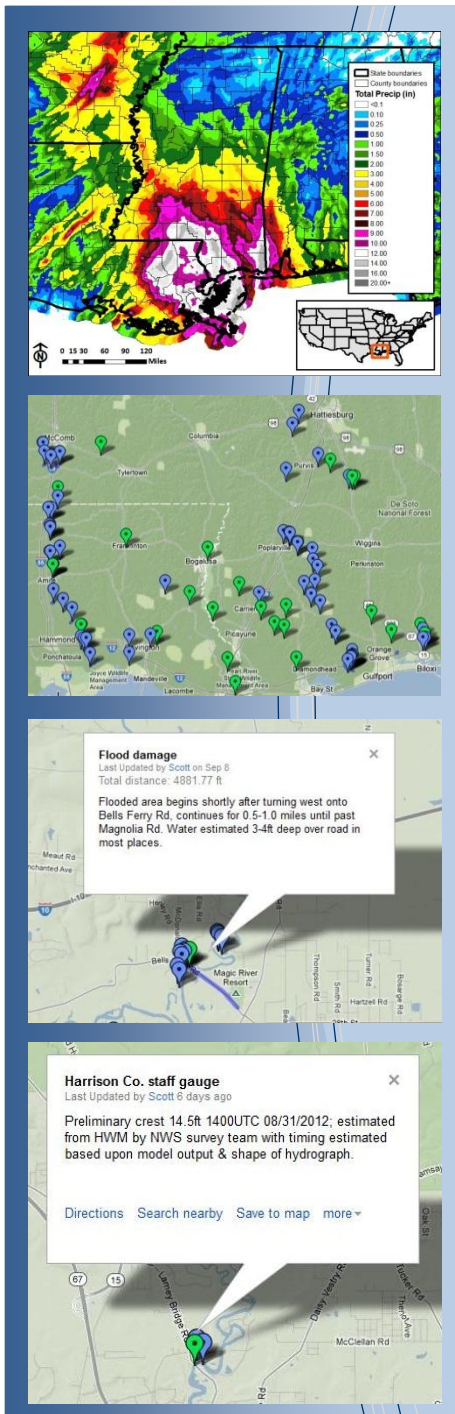
Earlier this year, Hurricane Isaac brought wind damage, storm surge, and river flooding impacts to the central Gulf Coast. Isaac was slow to develop as it moved through the Caribbean and into the Gulf of Mexico, not becoming a hurricane until about 24hrs prior to landfall on August 29th along the Louisiana coastline. Just prior to landfall, Isaac's forward speed decreased substantially, allowing bands of heavy rainfall to continuously impact portions of the Lower Mississippi River Forecast Center (LMRFC) forecast area from August 28th through August 30th. Multisensor best-estimate rainfall produced by the LMRFC indicated that most areas in southeast Louisiana and south Mississippi received at least 5" of rainfall, with a few areas exceeding 15". Moderate to major flooding occurred on several rivers in the LMRFC forecast area, including the Wolf, Tangipahoa, Bogue Chitto, and Wolf Rivers, to name a few. A couple new records were also set in the hardest hit areas.

Because of the significance of the flood event produced by Hurricane Isaac, the LMRFC organized flood survey teams catalogue the damage, review the impact statements, and estimate high water marks where necessary. The survey teams consisted of several LMRFC hydrologists and the service hydrologists for WFOs New Orleans/Baton Rouge, Lake Charles, Jackson, and Birmingham. Surveys were conducted over a 4-day period from September 5th through September 8th.

During the surveys, a large volume of data was accumulated including maps of flooded areas from local emergency management officials, anecdotes of flooding from affected residents, recommendations for updates to impact statements, recommendations for new impact statements, and even a few surveyed high water marks. It was determined that the best way to present this data would be create combine it all in one location using Google Maps.

All survey notes were geo-referenced, either as a line feature or a point feature. The notes were then digitized as the description to each feature in the map. Other useful information was also added to the map, such as crests from USGS-operated and locally-owned gauges. A post storm river flooding report is currently being written by the survey team using the Hurricane Isaac Google map. The map has improved the flow of writing, as sections could easily be ordered from upstream to downstream on a particular river and organized by river reach.

One unfortunate drawback to using Google Maps for documenting our flood surveys was the lack of support by NOAA accounts. At present, maps must be created by a regular Gmail account, and a NOAA account cannot even be given editing permission for maps created by someone else. Hopefully after the benefits of Google Maps are realized the service can be added in the future. For additional information, please contact Scott at scott.lincoln@noaa.gov.

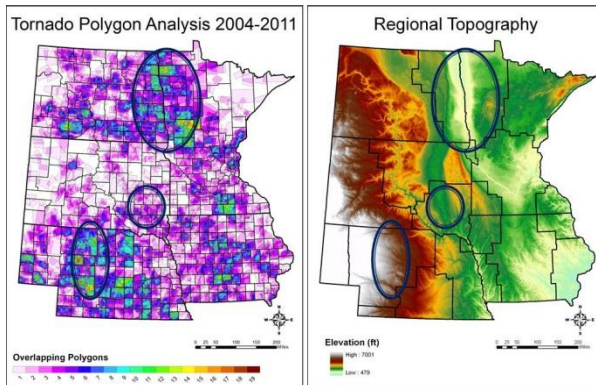
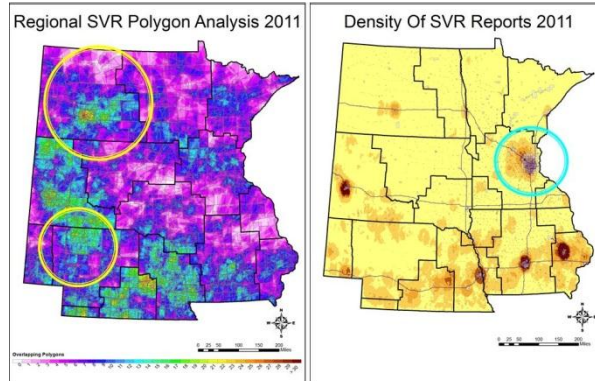


A Spatial Analysis of Storm Based Warnings across the Northern Plains Using Geographic Information Systems

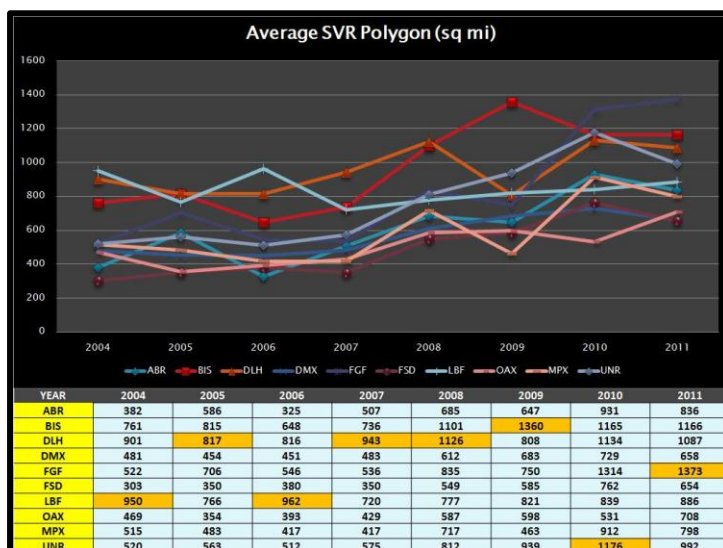
By: Kelly Serr & Mike Fowle - NWS Weather Forecast Office - Aberdeen, SD

The National Weather Service began transitioning from county based warnings to storm based warnings (SBWs) in 2004, with SBWs becoming an official NWS product on 1 October 2007. The goal of this new technique was to allow forecasters to issue more geographically specific short fused warnings with a reduction in false alarm area. In this study ArcMap has been used to perform a spatial analysis of SBW polygons across the northern plains. The spatial analysis is performed by counting the number of overlapping polygons over a defined region. The overlapping polygon maps were compared to the density of severe reports and topography. Conclusions pertaining to polygon size, storm development, the warning process, population, and topography are currently being analyzed.

The images to the right show a map of the density of severe polygons across the northern plains for 2011 (left) as well as a map of the density of observed severe reports (right). The circles on the severe polygon density map (left) denote regions where a high density of warning polygons is not well correlated with severe reports. Whereas the circle on the severe reports density map (right) denotes a high population center with many reports not well correlated with the density of severe polygons.



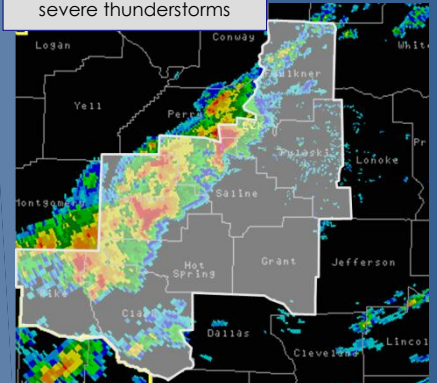
The images to the left show a map of the density of tornado polygons from 2004 to 2011 (left) along with a topography map (right). The circles denote regions of significant tornado density and the corresponding topography for those areas.



The chart above shows the average area of severe polygons in square miles per year and color coded by CWA. The chart also highlights the CWA with the largest average polygon area per year.

County-Based Warnings (previous methodology)

Three simultaneous
tornadoes within line of
severe thunderstorms



County-Based Tornado Warnings
8 Counties under warning
Almost 1 million people warned

Storm-Based Warnings (current methodology)

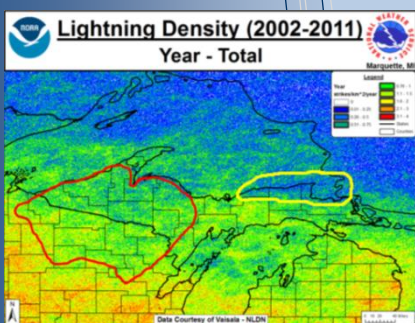
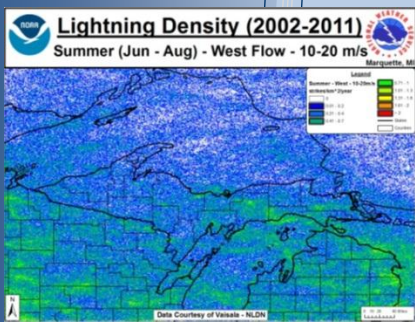
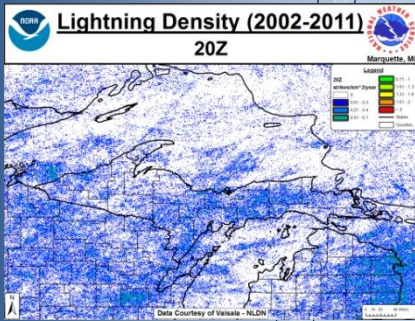
- More specific
- Increased clarity
- Supports latest dissemination technology



Storm-Based Tornado Warnings
70% less area covered
~600,000 fewer people warned

A Cloud to Ground (CG) Lightning Climatology for the Lake Superior Region

By: Steven Fleege & Mike Duffer - NWS Weather Forecast Office - Marquette, MI



Although thunderstorms are not as frequent across the Lake Superior region compared to other parts of the United States and Canada, lightning does pose a considerable risk to public safety, especially due to the numerous outdoor activities that occur in the late spring through early autumn months (May-September). Convective activity can come in several forms across the region, from afternoon and early evening diurnal thunderstorm activity, to late night and early morning nocturnal Mesoscale Convective Systems (MCSs). Adding to the complexity are the Great Lakes, and the associated land/water interface, which can dramatically alter thunderstorm development, intensity and maintenance. Therefore, we sought to provide a lightning climatology for forecasters at our office to assist with their thunderstorm forecasts.

To produce the lightning climatology for the Lake Superior region, we collected archived data from 2002-2008 from Florida State University and Visalia and supplemented it with an up-to-date locally created archive started in 2009. This data allowed us to create a 10 year (2002-2011) climatology of lightning over the Great Lakes region, although the current focus is over the Lake Superior region. Fortunately, each lightning strike is its only single element in a MySQL database, which allows meteorological data to be associated with it (from the North American Regional Reanalysis (NARR)). With data extracted from the database, ArcGIS ModelBuilder was used to automate the data conversion to Lightning Density plots, which enabled us to display the data in an easy to read format.

By looking at the basic lightning climatology (yearly, seasonal, monthly, and hourly) several features stood out, especially when comparing to terrain and land use. For instance, there is a marked decrease in lightning strikes as the land transitions from cropland to forested areas in northern Wisconsin and western Upper Michigan (circled in red in the included image). Another feature to note in this image is a lake shadow seen in certain locations near Lake Superior (one of the areas circled in yellow). These lake shadows could be seen in several monthly and seasonal images, depending on the time of the year. In addition, the monthly, seasonal, and hourly density plots showed areas of enhanced thunderstorms due to lake breezes.

With meteorological data being assigned to each individual lightning strike, we were able to extract all of the lightning strikes from similar flow regimes (using 700 hPa as a proxy) over Lake Superior. This provides an interesting look at the effect flow has on thunderstorms throughout the year and particularly during the summer months. West flow provides the most thunderstorms for the area, with a definite focus in the lake breeze region of eastern Upper Michigan during the 16Z to 01Z time period.

When looking at the wind speeds in westerly flow during the Summer, the most widespread lighting occurred in the 10-20 m/s range. This is to be expected, as it provides the shear needed to sustain the thunderstorm's updrafts. With lower wind speeds (< 10 m/s), the lightning density plots took on a more blotchy appearance of single-cell thunderstorms and the higher speeds (>20 m/s) there were large streaks that had the appearance of MCSs.

All of this data will eventually be available for the forecasters in the office to aid in forecasting locations of convection. Future work will be focused on having the data available in Google Earth or Maps, in addition to allowing user selectable times and meteorological conditions.

Conferences and Outreach Activities

2012 Kentucky GIS Meeting - Louisville

By: Erin Rau - NWS Weather Forecast Office - Louisville, KY

The 2012 Kentucky GIS Meeting "Changes in Latitudes" was held September 26-28 in Louisville. This year John Gordon, MIC at WFO Louisville, was asked by the president-elect of the Kentucky Association of Mapping Professionals (KAMP) to give the Keynote Address for this conference. The talk covered different ways we use GIS in our office both for internal benefit, as well as displaying information to the public. Topics covered included the automated daily precipitation and temperature mapping, use of the spotter database, display of historical data, and tracking radar beam blockage. In addition, I gave a short demonstration of the new webpages that have been developed at our office for the display and download (KMZ) of storm survey data entered into the NWS Damage Survey Web Editor. This conference was attended by over 350 people from around the state. After the keynote we were able to network with many people wishing to obtain more information on using the NWS's data.

Information on KAMP can be found at <http://kampro.org/>.

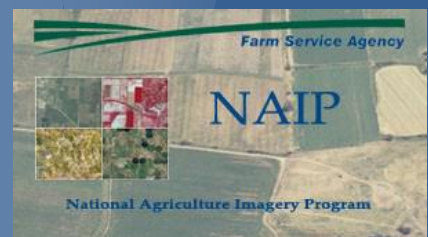
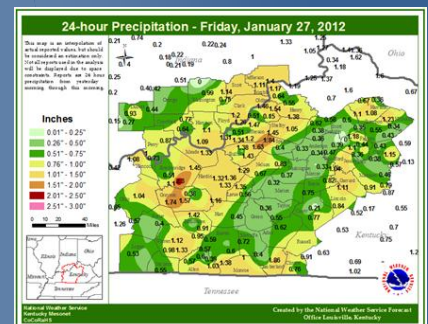
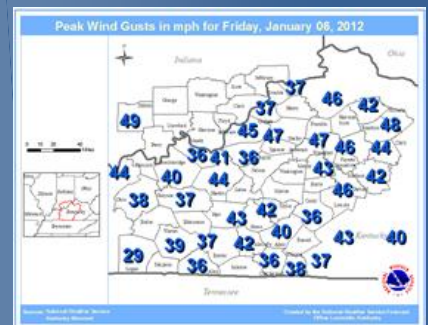
Kentucky Federal GIS User Group Meeting - Fall 2012

By: Linda Gilbert - NWS Weather Forecast Office - Louisville, KY

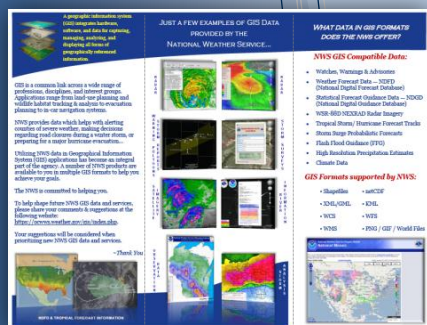
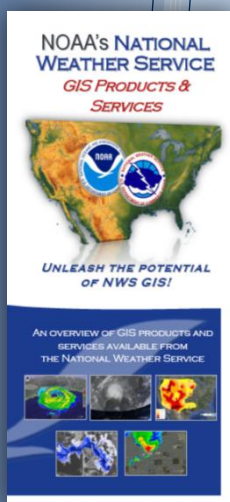
Twice a year, Federal employees who utilize GIS on a regular basis at their respective work establishments gather in central Kentucky to exchange ideas, thoughts, and other nuggets of information. These individuals come together in pursuit of gaining knowledge from each other in hopes of further advancing their own projects, capturing a glimpse of collaboration across all forms of government entities. Bringing to the table a wide variety of backgrounds in GIS, they met recently at the Kentucky GIS Conference held in Louisville on September 28th to discuss current projects and to take heed of some excellent pointers and tips on using Python with ArcGIS. This fall was no exception with turnout from Fort Knox, the USDA, and the US Army, to name a few. Past attendees have included representation from the USGS, the National Park Service, the US Bureau of the Census, etc.

The primary discussion at the meeting was NWS Louisville's own Mike Callahan with his presentation titled Python and ArcGIS. His talk touched on many of the key topics discussed in the article GISTools: A Collection of Python Modules to Make Maps found in the Spring 2012 edition of NWS Geospatial News. Details were given to attendees on the structure and data types of Python as well as some tricks that he has come across while developing maps for the local office. Overall, he highly recommends using Python over any other language for all of your scripting needs. There are some tools within ArcGIS to help compile the maps you may be attempting to make for your office but Python offers unique advantages such as ease of use and using it to generate stand-alone products. If you'd like more information on how to incorporate Python into ArcGIS or if you'd like a copy of the presentation he gave, please email him directly at Mike.Callahan@noaa.gov.

Closing conversations commenced among the attendees with one of the highlights coming from Steve Crabtree of the Natural Resources Conservation Service, USDA. He brought up a program that has been underway across the country known as the National Agriculture Imagery Program or NAIP. The latest 1 meter resolution digital orthophotography that results from NAIP will soon be available for the entire state of Kentucky, showing field boundaries, for example, and may already be available for your state. These images are designed to be used by both the public and private sectors in a variety of ways with a primary purpose within GIS. For more information, including how to obtain NAIP for your project, please visit the USDA's Farm Service Agency website at: <http://www.fsa.usda.gov/FSA/apfoapp?area=home&subject=prog&topic=nai>.



GIS Day: Wednesday, November 14th



GIS Day is Wednesday, November 14th. To help promote GIS Day across the National Weather Service, a 2012 GIS Day webpage has been developed from the collaborative efforts of both Central and Southern Region Geospatial Project Groups. NWS offices can create a "Top News of the day" link directly to the page at <http://www.crh.noaa.gov/ilx/?n=gisday> or you can copy the source code and modify it for your local office. This is a great way to educate the public on how the National Weather Service utilizes the capabilities of GIS to enhance our products and services.

An outreach brochure, like the one portrayed on the left, is also available via a link on the NWS GIS Day webpage. You are encouraged to use this brochure as needed for outreach events and conferences to promote NWS GIS products and services available to the public!



For additional GIS Day information and resources, please check out the GIS Day webpage at... <http://www.gisday.com/>. You can also find more info on their Facebook page at... <http://www.facebook.com/gisday>.

Please share your GIS Day activities, stories, and pictures with us! We will include them in the next edition of the NWS Geospatial Newsletter! You can email your articles submissions to darrin.hansing@noaa.gov.

Article Submissions

The NWS Geospatial Newsletter is provided by the Central Region Geospatial Projects Group. Special thanks to the Southern Region Geospatial Group for their assistance with this issue!

If you would like to submit content for future issues then please contact the editor, Darrin Hansing, at darrin.hansing@noaa.gov.

Article ideas:

- Project write-ups
- New products and web services leveraging GIS
- Geospatial tools and websites created to provide Decision Support Services and enhanced Situational Awareness
- Research enhanced through the use of GIS
- Conferences and outreach opportunities
- Training links, tips & tricks

